Smooth Stepper & Breakout Board for Mach3

Ethernet Smooth Stepper Feature

The 11-position green screw terminals that are on the USB SmoothStepper were replaced with a 3rd parallel port. It is identical to Port 2 of the SmoothStepper, which is a "bidirectional" port. The Ethernet SmoothStepper therefore has the following I/O possibilities:

Port 1: 12 Outputs and 5 Inputs

Port 2: 12 Outputs and 5 Inputs
  OR 4 Outputs and 13 Inputs

Port 3: 12 Outputs and 5 Inputs
  OR 4 Outputs and 13 Inputs

The maximum number of Outputs is 12 + 12 + 12 = 36. In that configuration there would be 5 + 5 + 5 = 15 Inputs.

The minimum number of Outputs is 12 + 4 + 4 = 20. In that configuration there would be 5 + 13 + 13 = 31 Inputs.

The other possibility is 12 + 12 + 4 = 28 Outputs, and 5 + 5 + 13 = 23 Inputs.

1.Install a "Plug-in"

Open the zip file and double-click the m3p file. It should copy it to the c:₩Mach3₩Plugins folder and rename it with a dll extension.
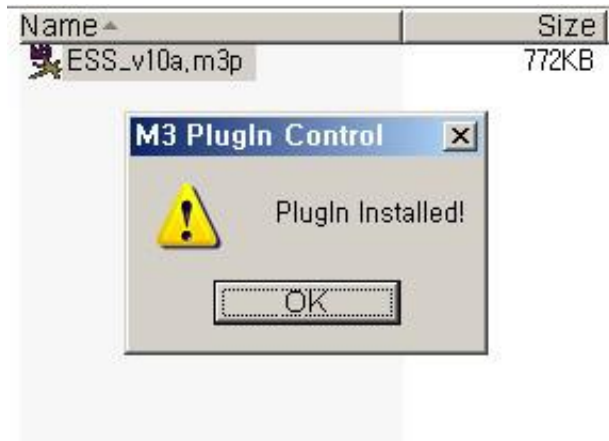
Run the "ESS_v10a.m3p"in the folder unzipped.

This file will be disappeared automatically while installing ESS, Plug-in

2. Set-up, "Ethernet"

Here are the instructions for configuring your computer's Ethernet port and running the plugin.

1. The computer's Ethernet port needs to be configured with a static IP address.   Usually Ethernet ports are set up for DHCP, which allows a cable or DSL router to assign a unique address to a device that is requesting an address for the local network.

Scroll down to the operating system you are using.

When you get to the part where you click the radio button that says "Use the following IP address", please type in the following:

IP address: 10.9.9.8 (or anything in the 10.9.9.x range, but not 10.9.9.9 because that is the address of the board)
Subnet mask: 255.255.255.0

By default it will show a Subnet mask of 255.0.0.0 after you type in 10.9.9.8   It must be changed to 255.255.255.0.

The Default Gateway may be left blank, as well as the Preferred and Alternate DNS servers.

That is all you need to do for the static IP address.

2. You can try running Mach at this point, but you might need to disable the firewall if it doesn't communicate.　When you run Mach, a firewall warning might pop up that says an application is trying to access the Internet.　Give it permission to do so.　I believe it needs to be valid for Public networks and not just Home or work (private) networks.　That way you won't need to disable the Firewall because you are creating an exception for Mach.
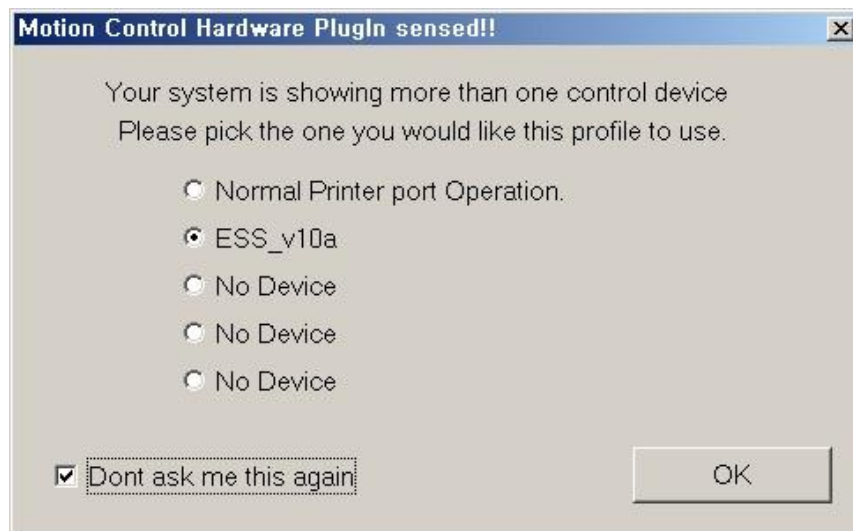
If you run "Mach3Mill" the window above will show up and choose "ESS-v10a" and click "OK"

If you checked,　"Don't ask me again"
It means that it will do automatically without asking next time.

Depending upon whether or not the user has previously checked off the box that says "Don't ask me again" when you select a motion control device, you might need to reset that.　In order to do that you will need to have Mach running (which means you will need to be pretending to be running another device such as the parallel port).　Choose the pull-down menu "Function Cfg's".　Then choose the option "Reset Device Sel...".　The next time you run Mach it will ask you which motion control device you want to run.

When you run the Ethernet SmoothStepper plugin, it will try to contact the board.

If this is the first time you are using this XML (profile) file, the IP address will not be set properly.

I am working on a better user interface for this so that it flows nicely. You will be presented with a semi-cryptic message that says:
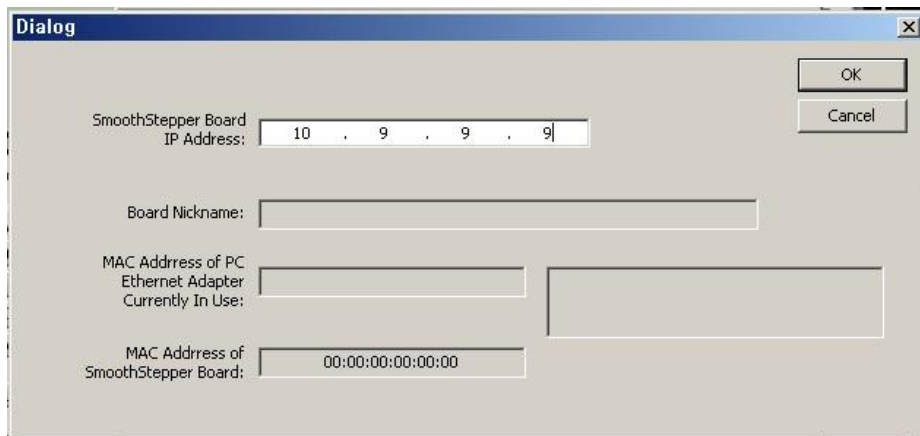
CTftp::WakeupClient Board does not reply.

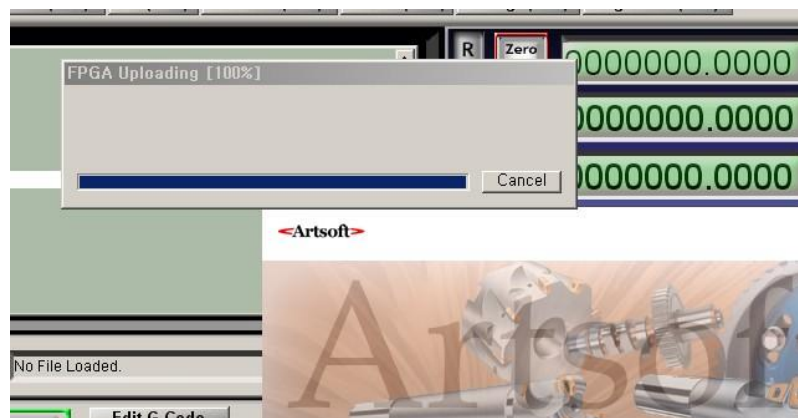Select YES to retry

No to config

Cancel to quit

Click No, and then you will be allowed to enter the Static IP address of the SmoothStepper board (10.9.9.9).
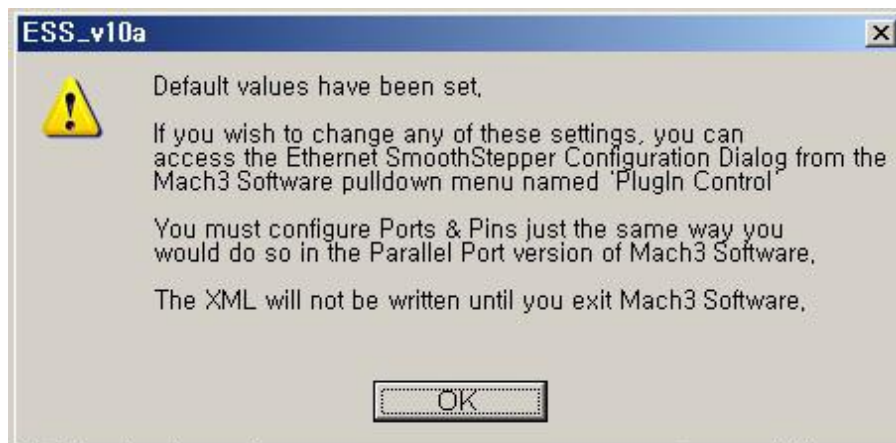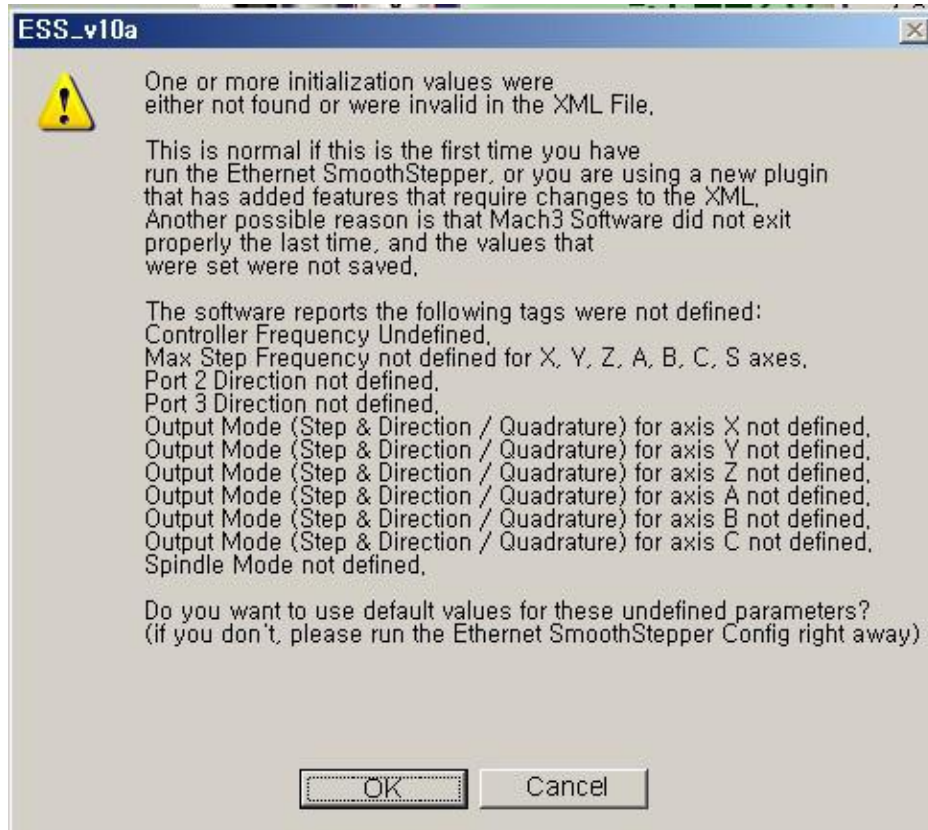

You will only need to do this once, since the next time Mach runs, it will find it in the XML file when it starts.

Set-up of Ethernet connection has been finished showing picture below
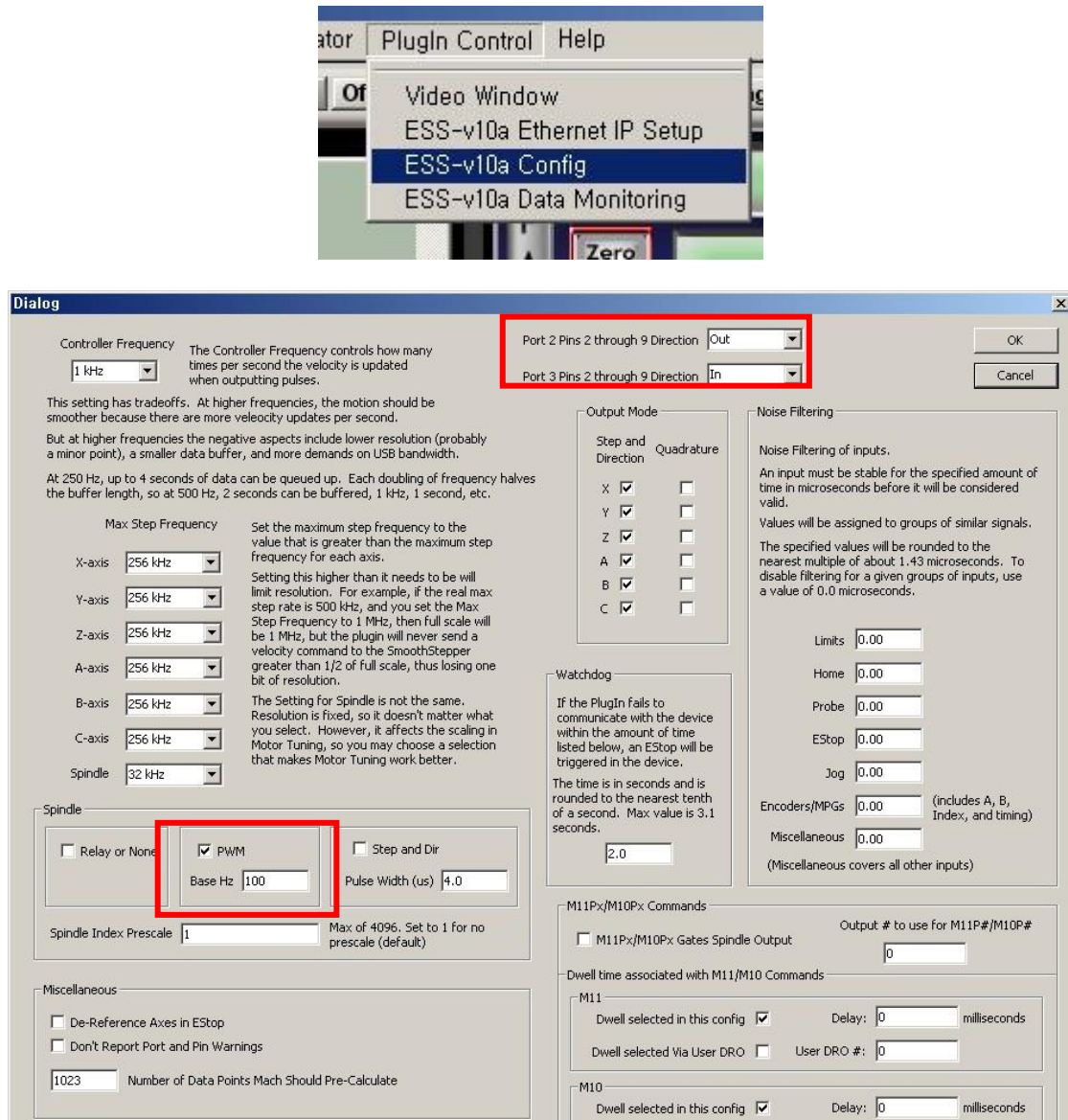And started to Mach3

It will come out the window as follows and select "Yes" and go on to next.

ESS_v10a

⚠ One or more initialization values were
either not found or were invalid in the XML File.

This is normal if this is the first time you have
run the Ethernet SmoothStepper, or you are using a new plugin
that has added features that require changes to the XML.
Another possible reason is that Mach3 Software did not exit
properly the last time, and the values that
were set were not saved.

The software reports the following tags were not defined:
Controller Frequency Undefined.
Max Step Frequency not defined for X, Y, Z, A, B, C, S axes.
Port 2 Direction not defined.
Port 3 Direction not defined.
Output Mode (Step & Direction / Quadrature) for axis X not defined.
Output Mode (Step & Direction / Quadrature) for axis Y not defined.
Output Mode (Step & Direction / Quadrature) for axis Z not defined.
Output Mode (Step & Direction / Quadrature) for axis A not defined.
Output Mode (Step & Direction / Quadrature) for axis B not defined.
Output Mode (Step & Direction / Quadrature) for axis C not defined.
Spindle Mode not defined.

Do you want to use default values for these undefined parameters?
(if you don't, please run the Ethernet SmoothStepper Config right away)

[OK]   [Cancel]

ESS_v10a

⚠ Default values have been set.

If you wish to change any of these settings, you can
access the Ethernet SmoothStepper Configuration Dialog from the
Mach3 Software pulldown menu named 'PlugIn Control'

You must configure Ports & Pins just the same way you
would do so in the Parallel Port version of Mach3 Software.

The XML will not be written until you exit Mach3 Software.

[OK]

5

3. Set-up, Mach3

Set Port & Pin to be fit with your equipment.

And Set-up for ESS, do as follows.

The Breakout board is linked with Smooth Stepper board & Two_26Pin_Flat cable. 26Pin_Flat cable is made by 25Pin_parallel port_signal and 1Pin for 5V inputting.

Each input/output port in breakout board is connected with the driver or can be joined limit & home sensor and it offers Relay contact signal for speed control of spindle & exterior device.
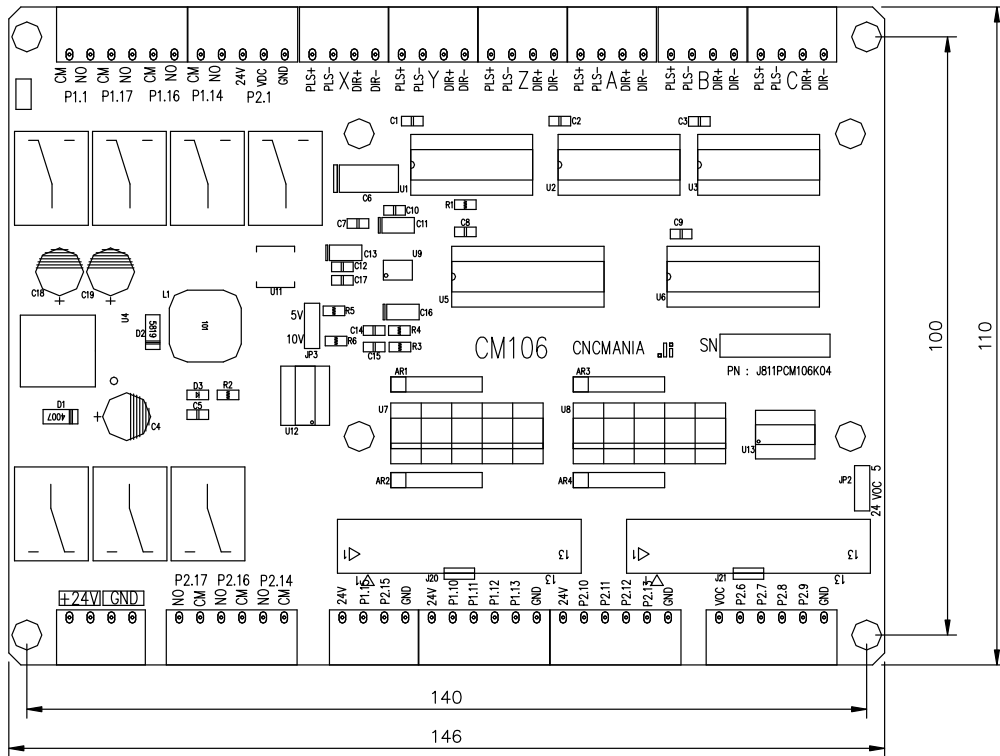
Unit mm
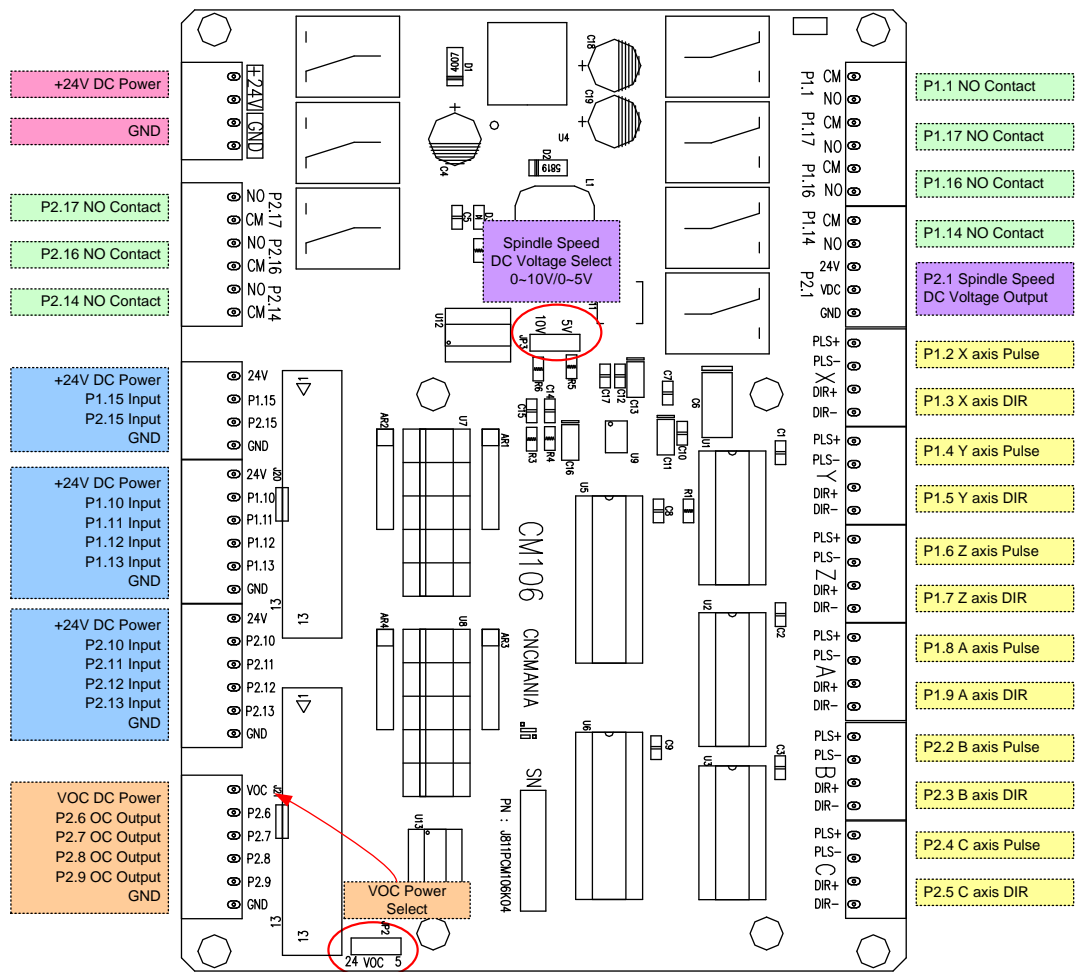
4. Detailed function

- Switch or Sensor Input Port.

+24V DC Power	◉ 24V
P1.15 Input	◉ P1.15
P2.15 Input	◉ P2.15
GND	◉ GND
+24V DC Power	◉ 24V
P1.10 Input	◉ P1.10
P1.11 Input	◉ P1.11
P1.12 Input	◉ P1.12
P1.13 Input	◉ P1.13
GND	◉ GND
+24V DC Power	◉ 24V
P2.10 Input	◉ P2.10
P2.11 Input	◉ P2.11
P2.12 Input	◉ P2.12
P2.13 Input	◉ P2.13
GND	◉ GND

There are total 10 connectors (5 for port1 / 5 for port2) as above picture, It has each 4 or 6 pins. 24V Pin here provides power of exterior sensor and can be joined to the sensor to be input by +24V

If the sensor is the contact by type of switch, you can do not to use 24V Pin.

Input signal here can connect "High" "Low" & "Switch Contact"
The operation for each inputting can modify setting in port & pins in menu after checking it in Diagnostics(Alt-7)

It can link with emergency stop button to halt the system in this port
when the emergency and can connect other input button too.

● Speed Control of spindle & Relay Port for controlling exterior device.

P1.1	CM
	NO
P1.17	CM
	NO
P1.16	CM
	NO

P1.1 NO Contact

P1.17 NO Contact

P1.16 NO Contact

P2.17 NO Contact

P2.16 NO Contact

P2.14 NO Contact

P2.17	NO
	CM
P2.16	NO
	CM
P2.14	NO
	CM

P1.14	CM
	NO
P2.1	24V
	VDC
	GND

P1.14 NO Contact

P2.1 Spindle Speed
DC Voltage Output
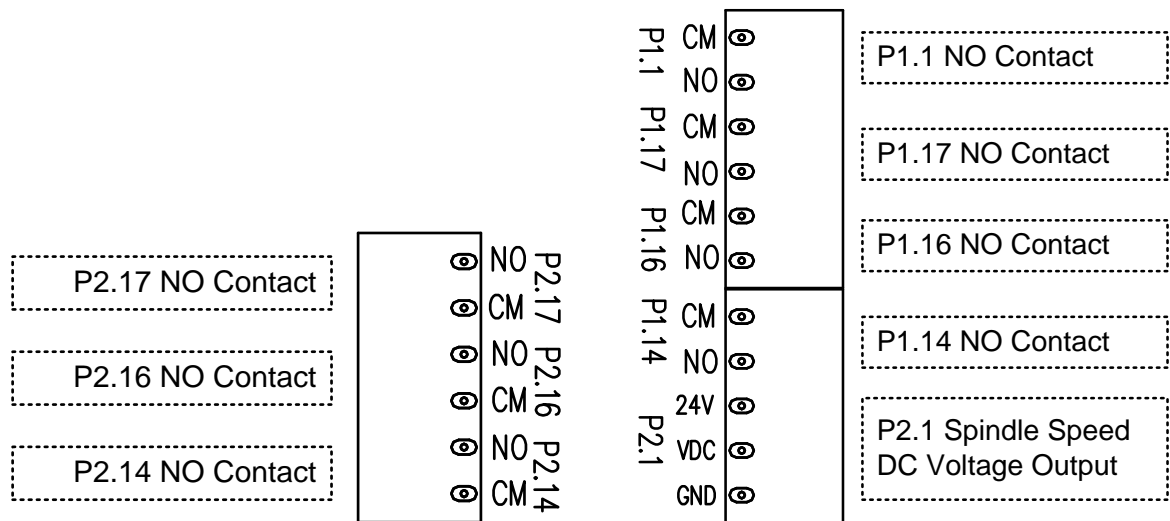
This port outputs 0~5V or 0~10V DC voltage for speed control of spindle.
In Mach3, it is outputted after the PWM signal is converted to DC voltage when speed control of spindle by PWM mode.
For DC voltage can change speed of motor by connecting to servo driver or inverter. You use No. 1 Pin in Port2

JP3 10V 5V

Spindle Speed
DC Voltage Select
0~10V/0~5V
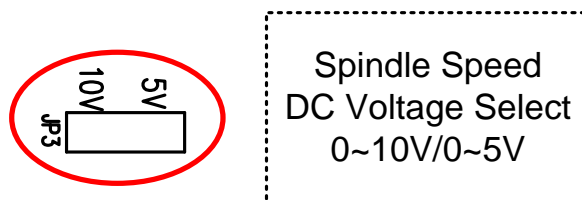
The output voltage is selected 0~5V or 0~10V range.

Relay Port is comprised of COM & NO.
"NO" is normal open so, it is open usually and if the relay works,
it means that it is connected.
No.1, 14, 16, 17 in Port 1 and No.14, 16, 17 in Port 2 are allocated.

To extend exterior output, you should need an output control code.
For an example, the 14 in Relay port P2 above is allotted by Pin No.14 in port2 and it is set Output #3.
This output can use after assigning to M3, M7, or M8 but I show you another example to use making other M Code.

M code is saved in Mach3-macros-Mach3Mill.
Open an note pad to create a new M code

ActivateSignal(output3)
Put down above and save as M12.m1s

DeActivateSignal(output3)

Put down above again and save as M13.m1s

And if you spell M12 in MDI screen, the relay3 should be "On"
If you spell M13, you can check it out that it should be "Off"

MDI input window is in MDI(Alt-2)
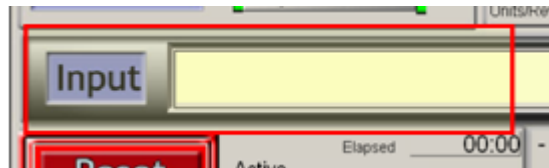

- Port connecting to driver

P1.2 X axis Pulse

P1.3 X axis DIR
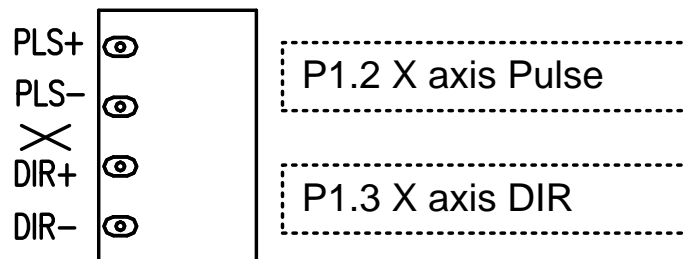
This is the port to join the driver in each axis and is made by Pins above. This port can link with revolving axis as well as moving straightly in each axis and can do also speed control for by connecting to motor driver for spindle.
For linking with driver, It applies +/- line driver and
is the output 1pulse as DIR / PLS
It is allotted 2~9 in port1 and 2~5 in port2

EX) Samsung servo
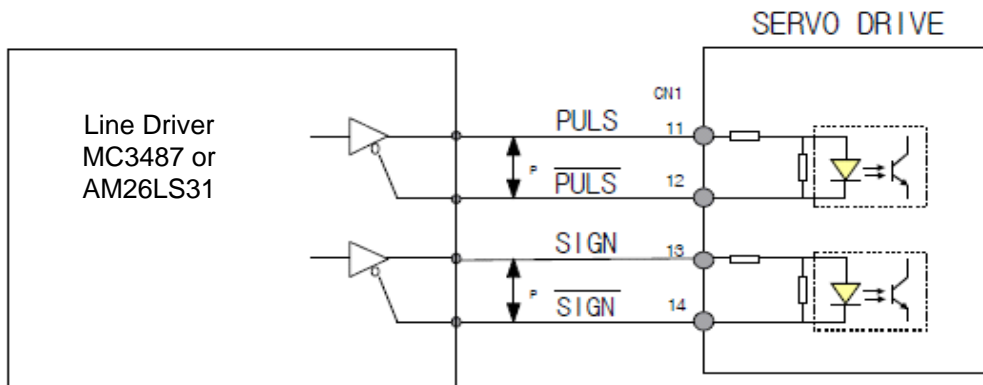
"DIR" & "SIGN" as direction signal are same.

"PLS", "PULS", "CLOCK", & "CLK" as pulse signal are same.

● Open Collector / Output Port

It is assigned 6,7,8,9 in Port2 and can join motor driver & can link with the relay for exterior control too.

Power VOC using here can select below pins.

If you connect with motor driver, use 5V and if the relay, use 24V
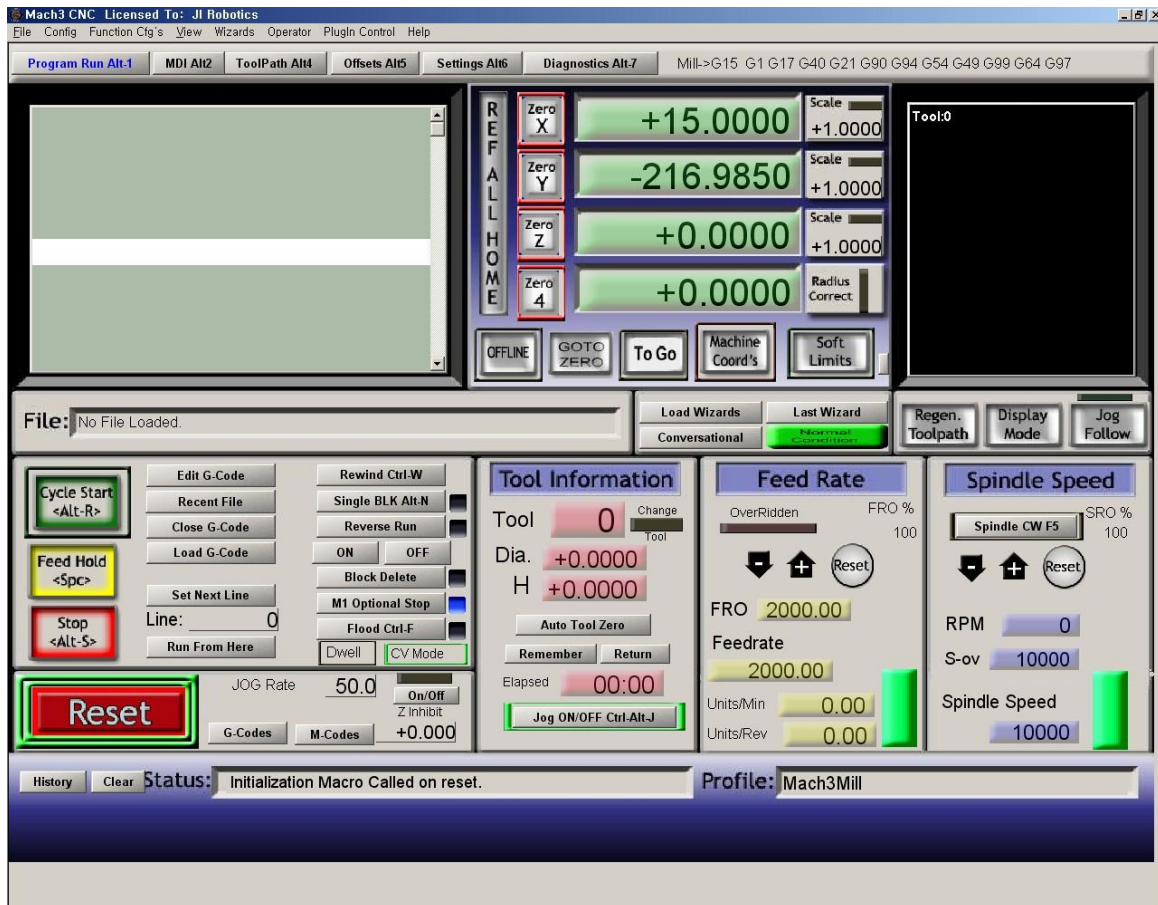
- Power Input Port

| +24V DC Power |
| GND |
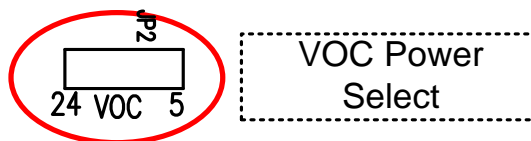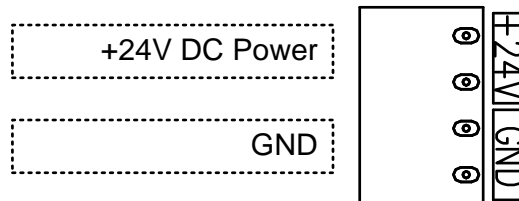
It is the port accepting +24V power for Board-driven.
If you don't use Power for driver in exterior, it has about 80mA current consumption.

It doesn't need to input power to smooth stepper board.
It is providing 5V power from CM106 board through 26Pin Flat Cable.

5. Mach3 / Run Screen

6. Mach3 / Set-Up

"Set Value" made here, is just an example.
It can possible to set it variously and can do detailed modification.

Menu / Config → Select Native Units→ Choose " MM's "
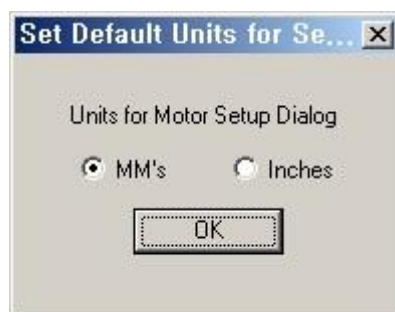
Menu / Config → Set up in Port and Pins as below.
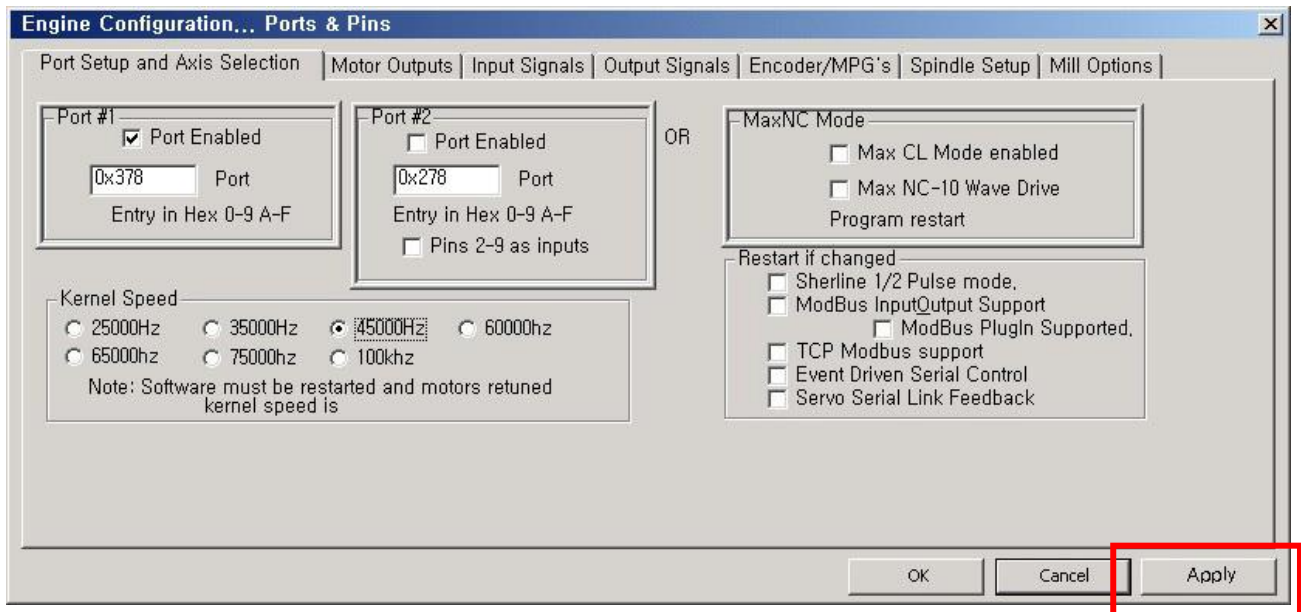
Confirm Pin No. & Port No. exactly.

**** Make sure to press "Apply" button before going on to each tap.
If it is not, it isn't saved. ****
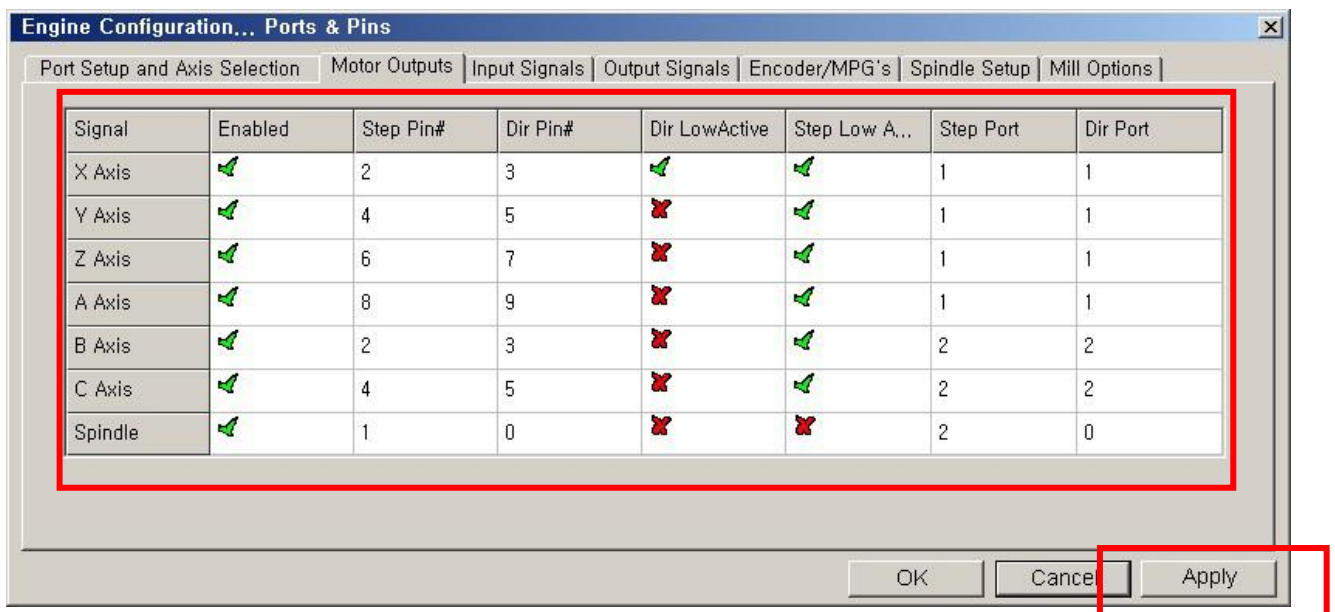
If you use A,B,C axis, Set up them and if you don't want to,
Remove "Enabled"

For both "Dir Low Active" and "Step Low Active"
You should set after judging the direction well in each axis in CNC in view of surroundings your driver is working.

And Voltage Output Pin for speed control of spindle is set No.17

This process can be differ depending on users and it has to be followed some efforts experiencing a few trial & error experiments.
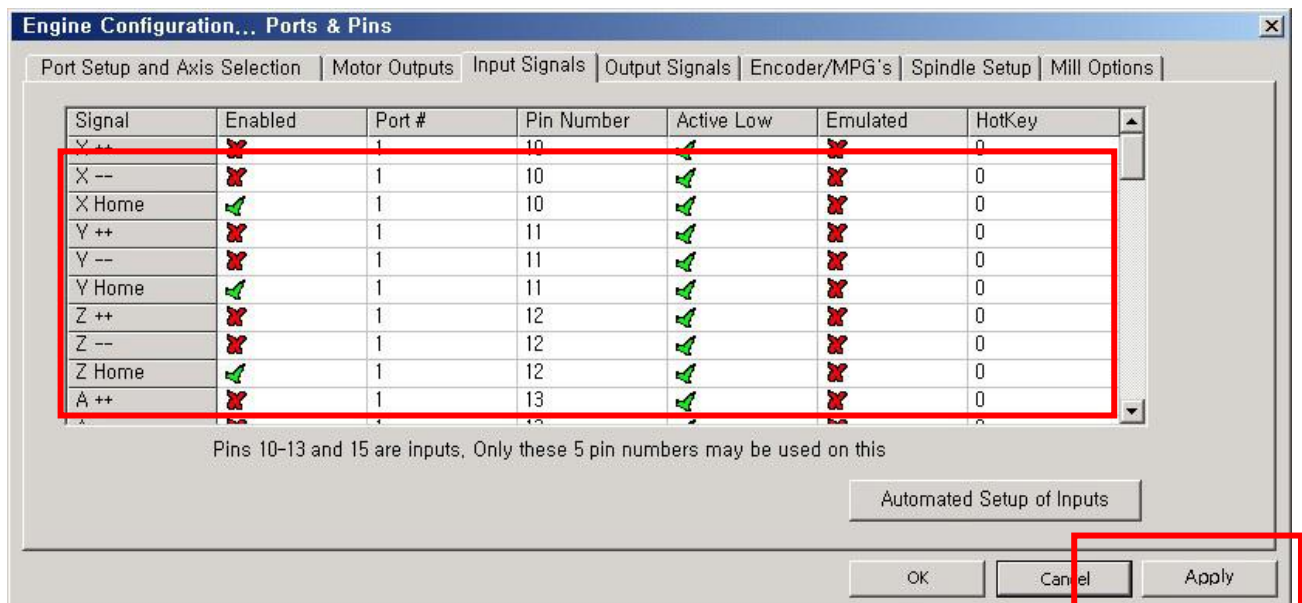
Set up X Home, Y Home & Z Home.
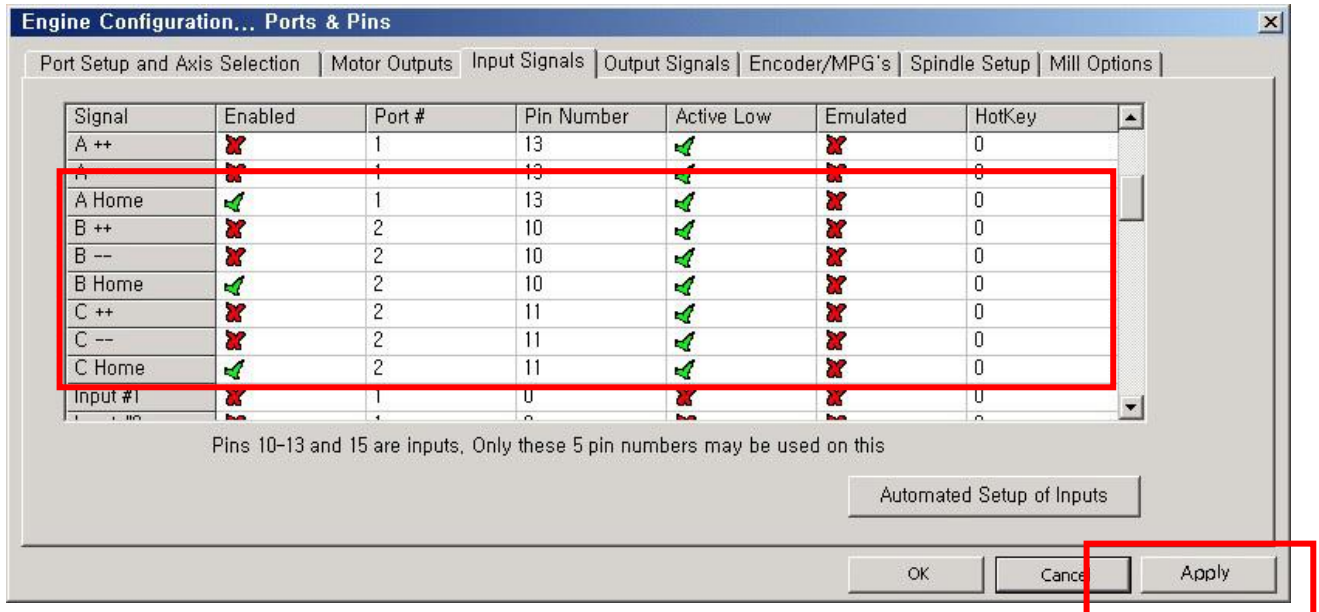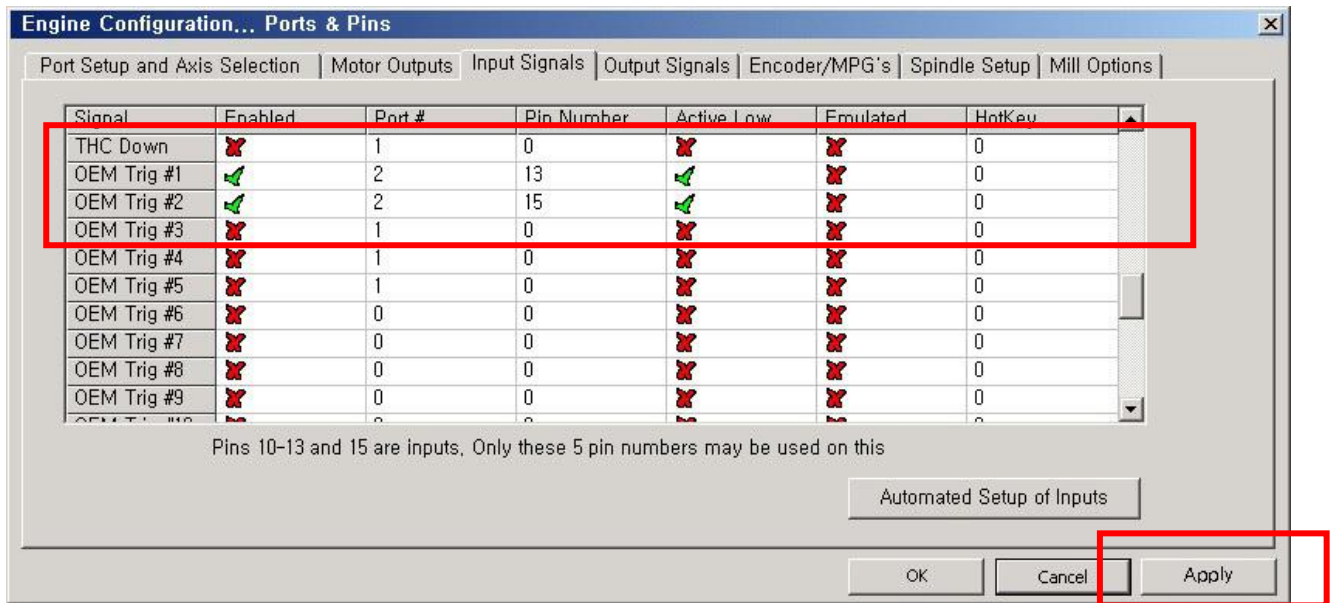
If use A,B,C axis, set it and if it is not, remove "Enable"

"Set Value" can be much different because users could do "Home" or 'Limit"
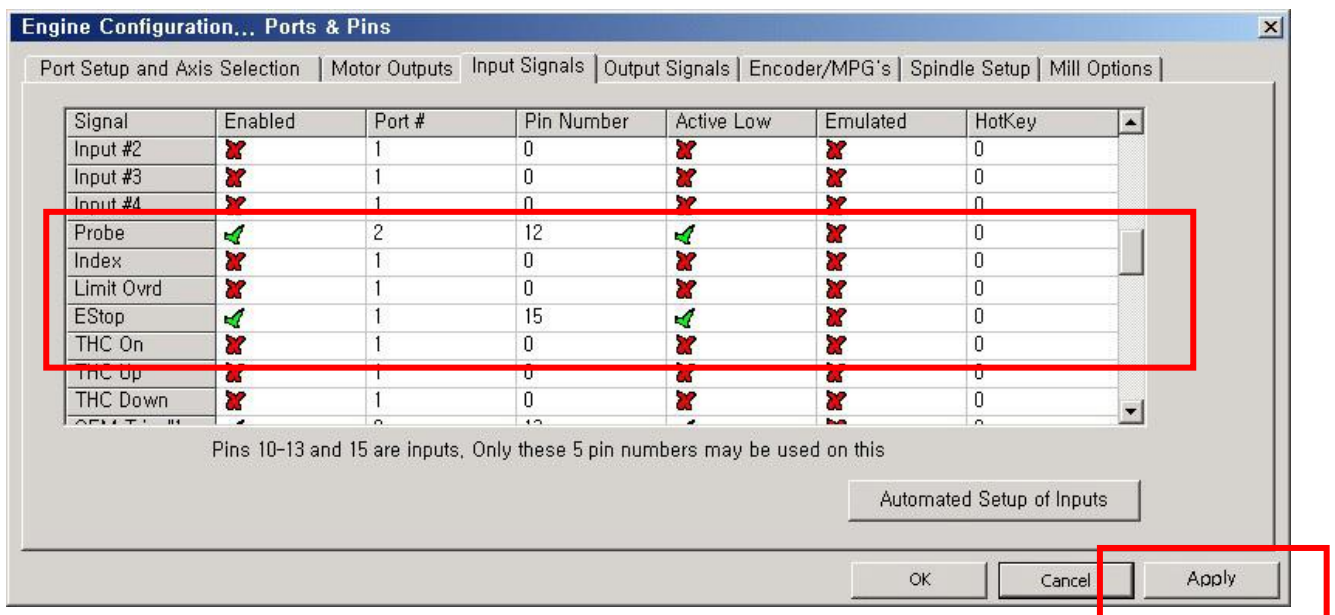
Set up "EStop Pin" as above.

In "ActiveLow" case here, should apply after checking out whether your emergency stop button is "Active Low" or "Active High"

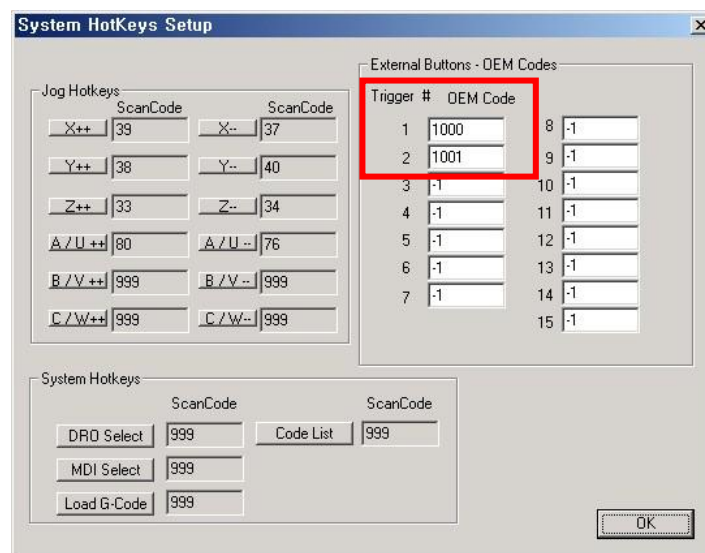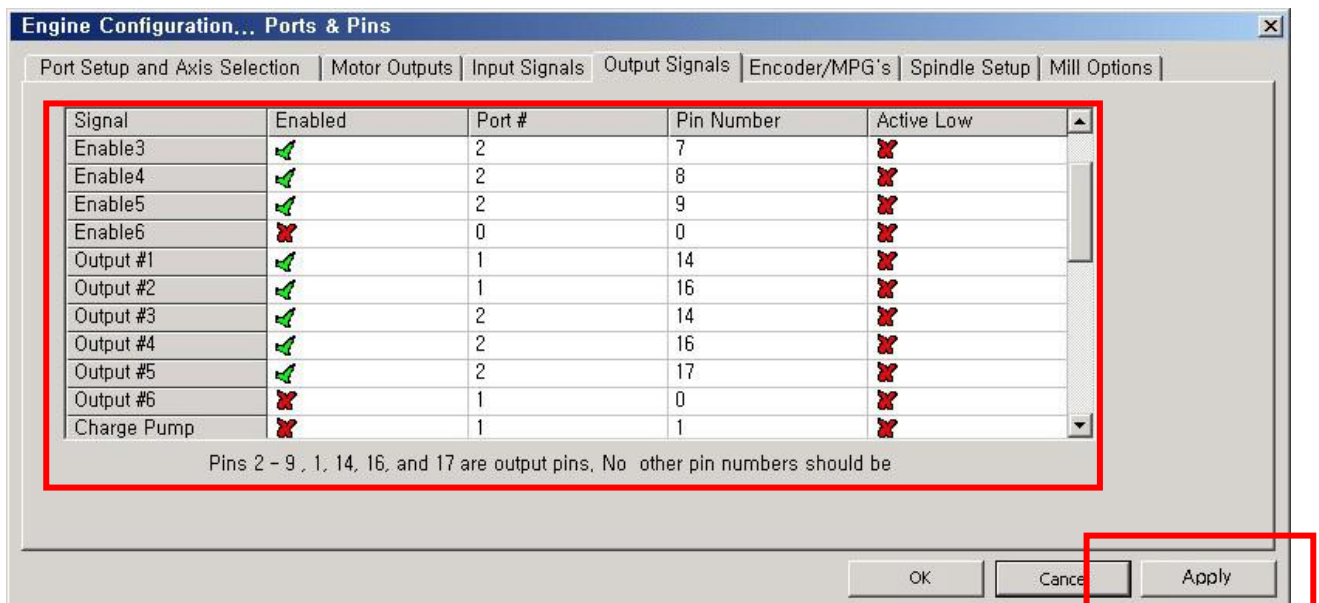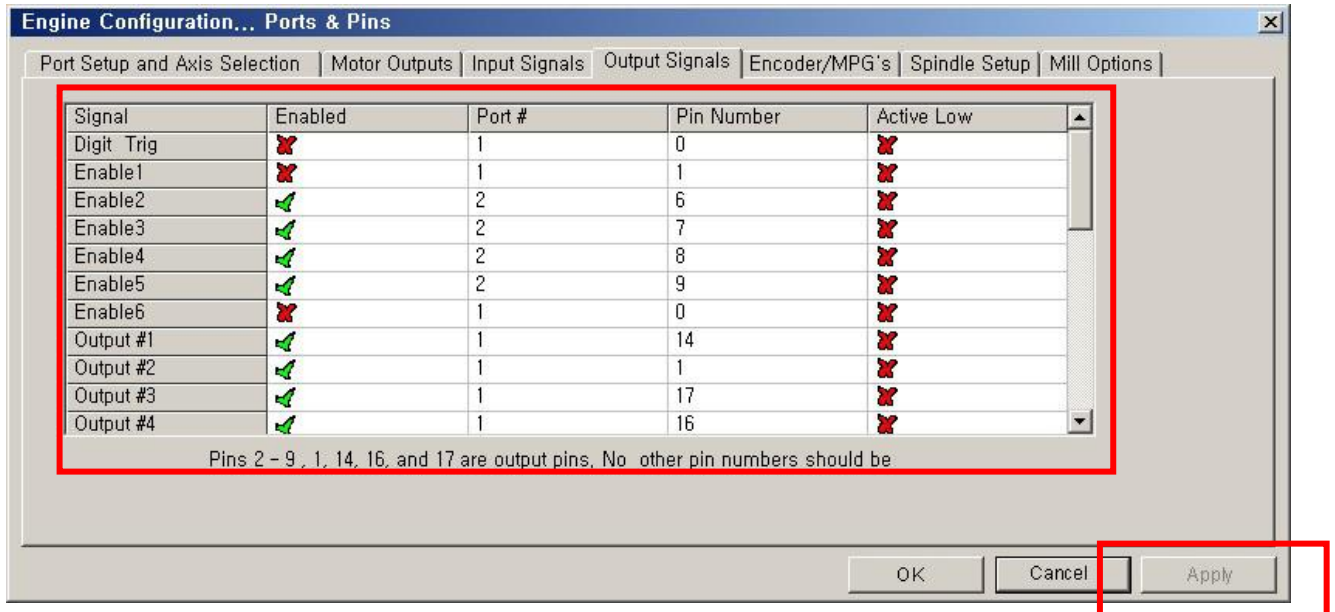For probe, it is allotted for Tool Zero Sensor in Z axis.

For OEM Trigger #1 & #2 are assigned for Cycle Start and Feed Hold button.

The 1000 inputted in OEM Trigger #1 is Cycle Start OEM Code.
1001 of #2 is OEM Code in Feed Hold.
For more detailed thing, hope to refer to MACH3 manual.

Engine Configuration... Ports & Pins

Port Setup and Axis Selection | Motor Outputs | Input Signals | Output Signals | Encoder/MPG's | Spindle Setup | Mill Options

Signal	Enabled	Port #	Pin Number	Active Low
Digit Trig	✗	1	0	✗
Enable1	✗	1	1	✗
Enable2	✓	2	6	✗
Enable3	✓	2	7	✗
Enable4	✓	2	8	✗
Enable5	✓	2	9	✗
Enable6	✗	1	0	✗
Output #1	✓	1	14	✗
Output #2	✓	1	1	✗
Output #3	✓	1	17	✗
Output #4	✓	1	16	✗

Pins 2 – 9 , 1, 14, 16, and 17 are output pins, No other pin numbers should be

OK   Cancel   Apply

Engine Configuration... Ports & Pins

Port Setup and Axis Selection | Motor Outputs | Input Signals | Output Signals | Encoder/MPG's | Spindle Setup | Mill Options

Signal	Enabled	Port #	Pin Number	Active Low
Enable3	✓	2	7	✗
Enable4	✓	2	8	✗
Enable5	✓	2	9	✗
Enable6	✗	0	0	✗
Output #1	✓	1	14	✗
Output #2	✓	1	16	✗
Output #3	✓	2	14	✗
Output #4	✓	2	16	✗
Output #5	✓	2	17	✗
Output #6	✗	1	0	✗
Charge Pump	✗	1	1	✗

Pins 2 – 9 , 1, 14, 16, and 17 are output pins, No other pin numbers should be

OK   Cancel   Apply

Enable 2~5 is the pin assigned by Open Collector Output.

For Output #1, #2, #3, #4, & #5Pin are relay output port and set as above.

In ActiveLow, should apply after thinking according to exterior device connected your CNC.

If you want to use spindle & pump for cutting oil, remove "checking" above picture.

If it is checked, it means that it does not use.

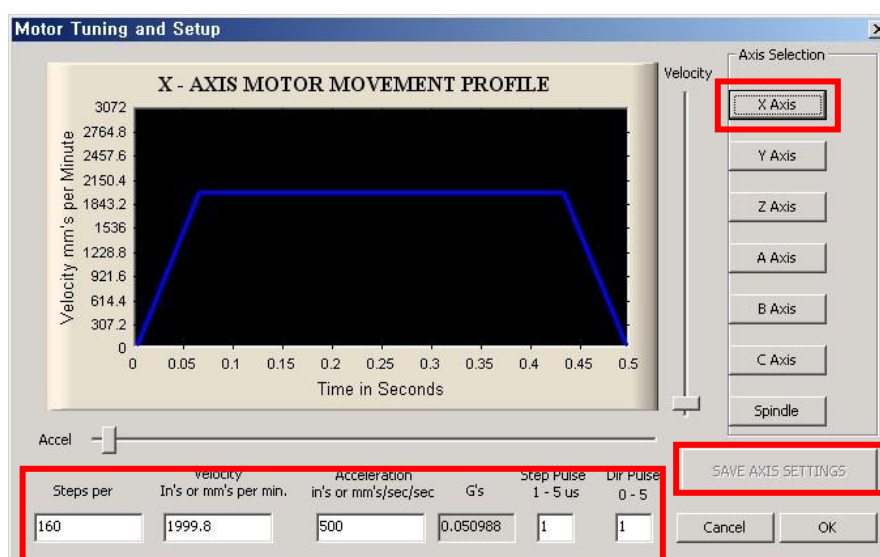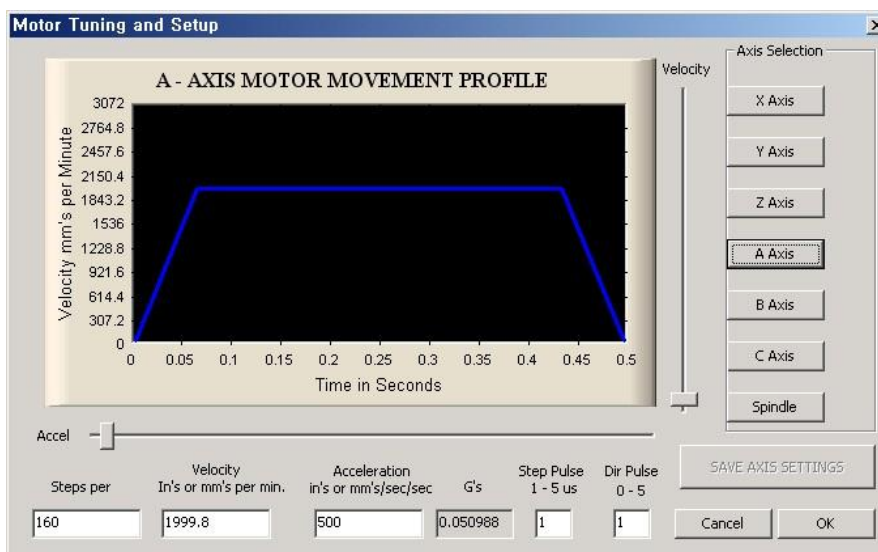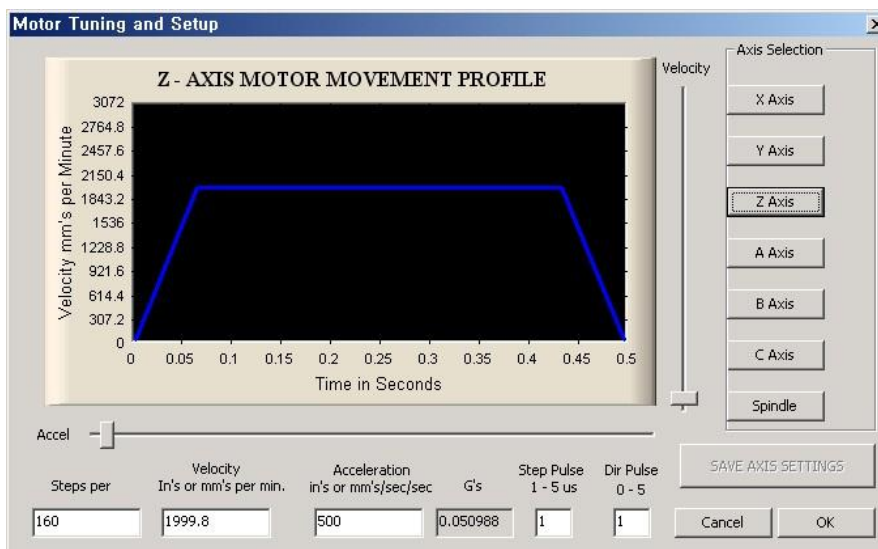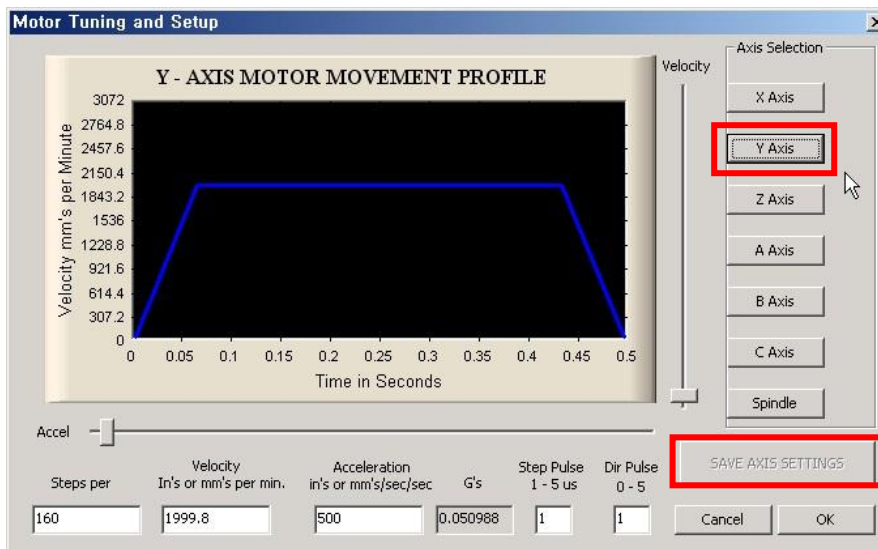To set speed control of spindle is as follows..
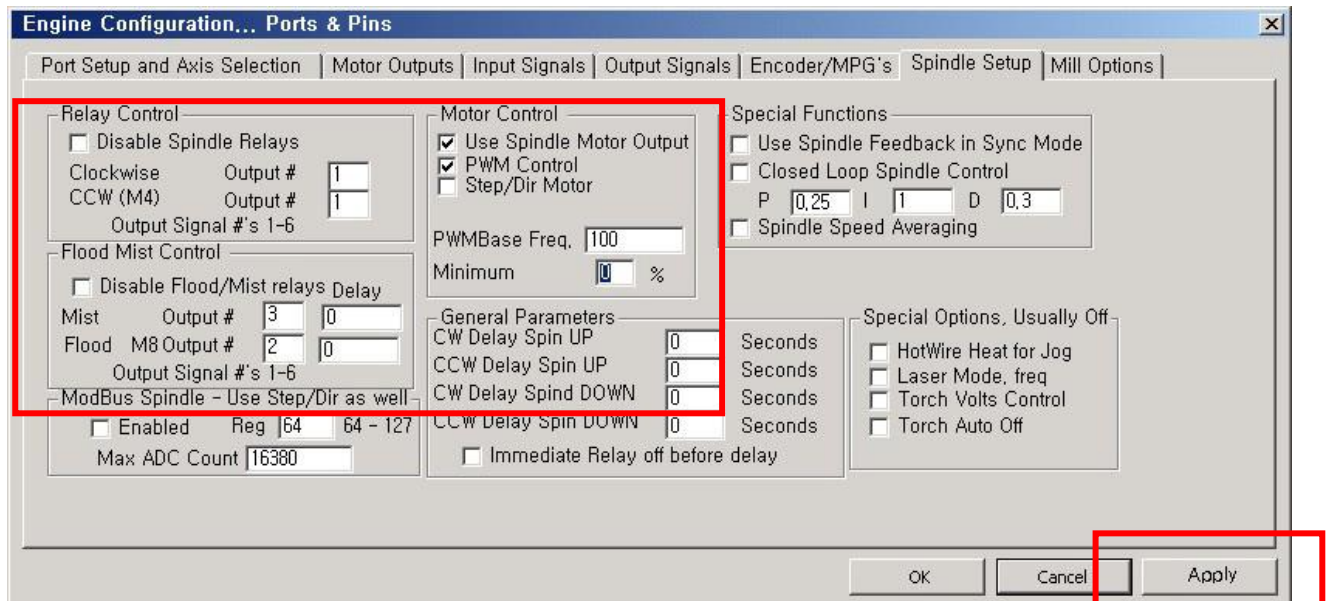
7. Motor Tuning

Menu / Config → choose " Motor Tuning"

Select "X axis" and set to be fit user's equipment.
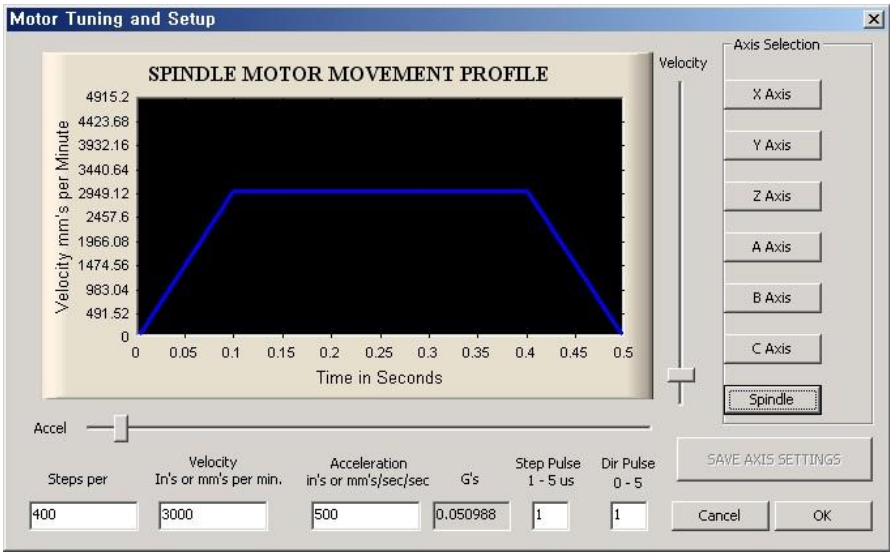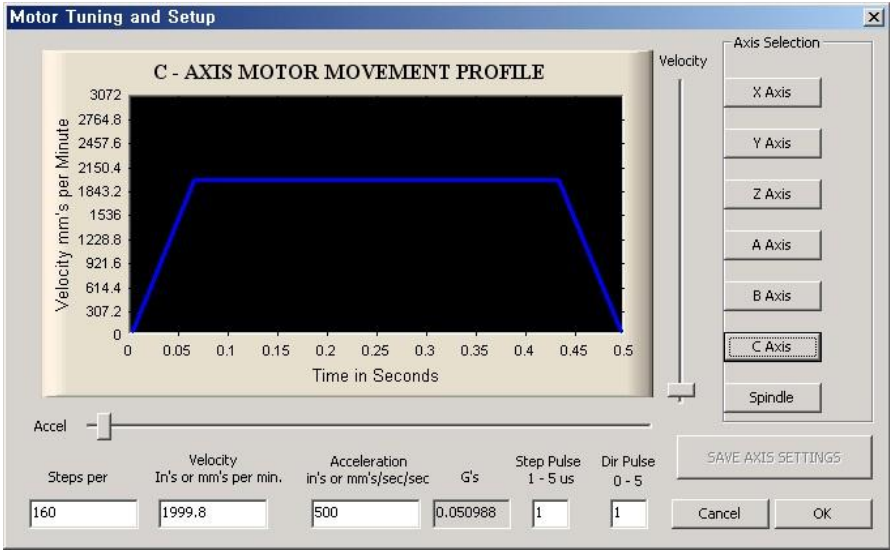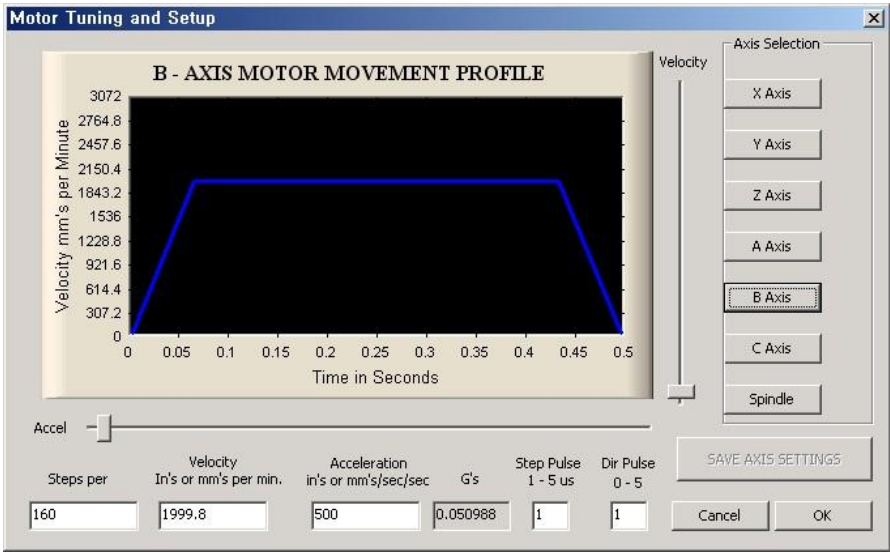
For Velocity or Acceleration, it can alter adequately.

***** Make sure to press "Save Axis Setting" after inputting.

Menu / Config → Choose "Motor Homing" and set as below.

For more detailed explanation as for each functions, refer to mach3 program manual.
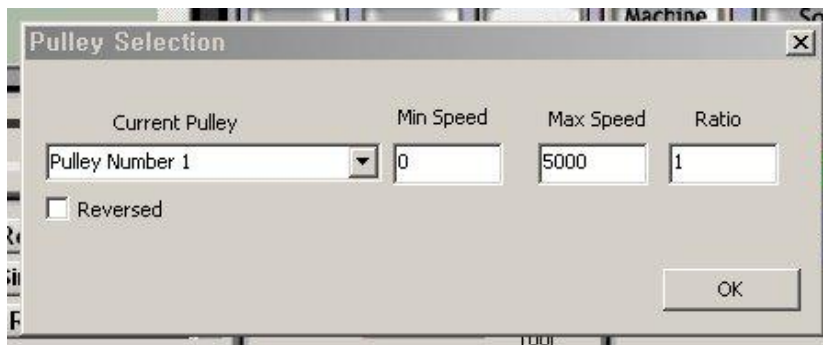
8. How to adjust spindle speed

Set up as follows after you finish setting above.
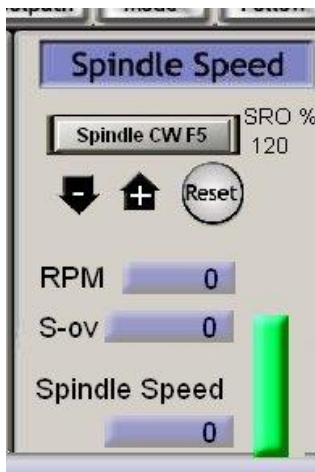Config → Click "Spindle Pulleys"

Input "Max Speed" of spindle as below.
If Max Speed is 20,000RPM , input 20000

If so, can do speed control of spindle in mach program.

If it is S1000 on G code, It means the spindle RPM is 1000 and if it is S5000
It means the RPM is 5000

9. Further Information

Allotted pin for Home & Limit Sensor is available in many ways.
You can connect one pin together to Home & Limit sensor in each axis in CNC and the rest of pins can be allocated by switch input too after setting up Probe Sensor or OEM Trigger.
For more detailed, refer to MACH3 manual.

** If you have any questions or concerns, feel free to contact us anytime via facebook below.

Go to Page :   http://www.facebook.com/pages/JI-Robo-Cnc/102510056566519?ref=hl

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